

# Quick Start Manual

(Industry's Toughest Built Paddle Wheel Flow Meter)

**No K-Factor Programming**



## TKR SERIES

- Flow Rate + Flow Totalizer
- 2 Levels of Password Security
- LED Display
- No Tools Required



**Read the User's Manual Carefully before Starting to Use the Unit.**

**All TK Series Flow Meters are Factory Calibrated and do not require K-flow Factor Programming.**

**Manufacturer reserves the right to implement changes without prior notice.**

## PRODUCT SELECTION

### EXAMPLE

TKRP ----- 25 ----- A ----- P  
(1) (2) (3) (4)



#### 1. SERIES

**TKRS** = Paddle Wheel Flow Meter with  
Relay Output

**TKRP** = Paddle Wheel Flow Meter - Flow  
Rate + Flow Total Pulse Output

**TKRM** = Paddle Wheel Flow Meter -  
4-20mA Output Flow Rate + Flow Total Pulse Output

#### 2. PIPE SIZE

15 = (1/2") / 20 = (3/4")

25 = (1") / 40 = (1 1/2")

50 = (2") / 80 = (3") / 100 = (4")

#### 3. BODY MATERIAL

P = PVC

PP = Polypropylene

PF = PVDF

#### 4. COMMUNICATION

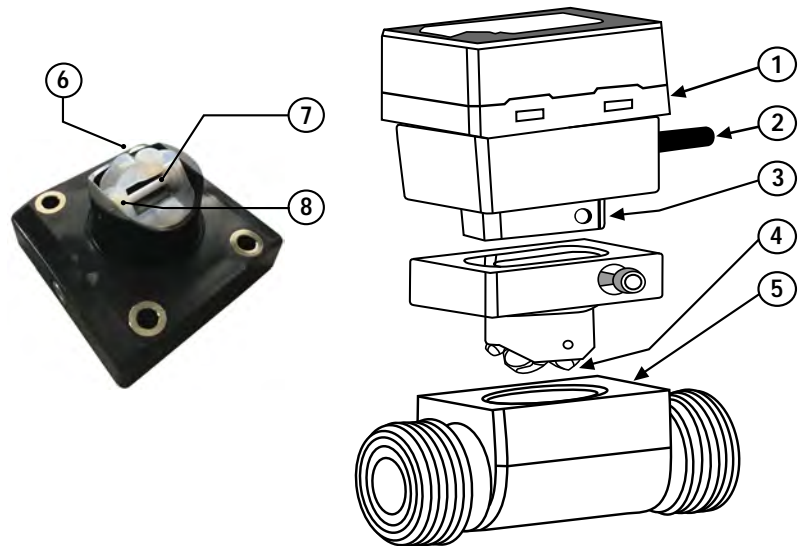
RS = TKRP Series with RS-485 MODBUS  
selectable

#### 5. CONNECTION METHOD

M-M12 Connector - 2Meter - other lengths  
available

## PARTS TKR SERIES

1. Flow Controller
2. Power Supply
3. Hall Sensor
4. Paddle Wheel
5. Body (PVC, PP, PVDF)
6. Tefzel Paddle
7. Rotor Pin
8. Bearing



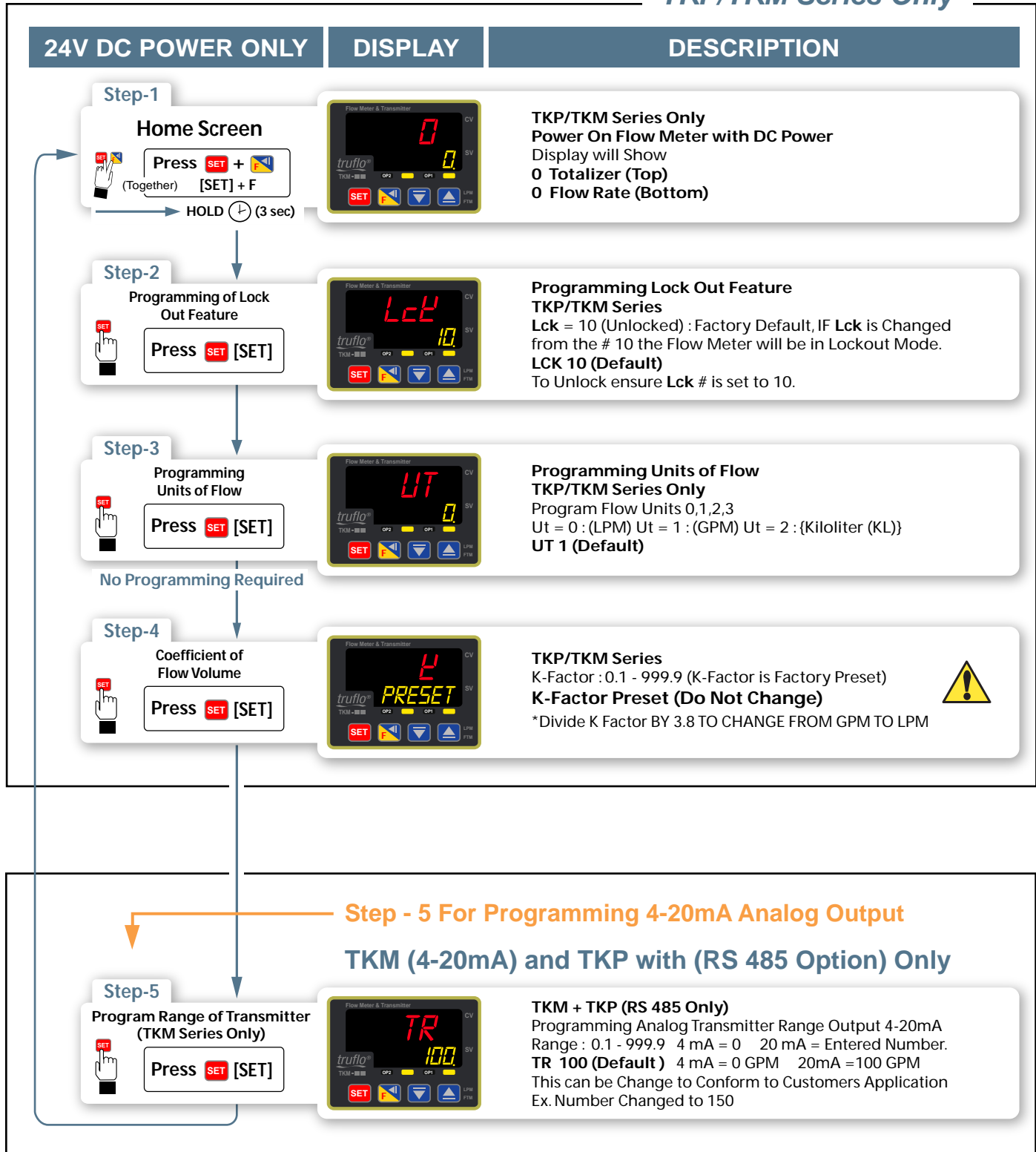
## SPECIFICATIONS

<b>Fluid</b>	Water or Chemicals Liquid - Viscosity Range : .5-20 centistokes	
<b>Accuracy</b>	> + 1.0% of F.S. @ 20°C (68°F) - Repeatability + .5% of Full Scale	
<b>Max Flow Velocity</b>	10 m/s max - (32.8 ft/s max)	
<b>Min Flow</b>	0.3 m/s min. - (.98 ft/s min)	
<b>Operating press</b>	150 psi	
<b>Turndown</b>	33:1	
<b>Response time</b>	Real Time	
<b>Material of Construction</b>	<b>Paddle :</b> Tefzel <b>Shaft :</b> Zirconium Ceramic	<b>Body :</b> PVC/PP/316 <b>Seals :</b> EPDM/FPM
<b>Operating Temperature</b>	PVC < 60°C (140°F) PP < 80°C (176°F) 316 SST < 120°C (148°F)	
<b>Electronics</b>	+ 50°C (122F)	
<b>Protection Class</b>	IP66 NEMA 4X	
<b>Approval</b>	CE Rohs	
<b>Current Draw</b>	60mA Max	
<b>Battery</b>	10-30VDC	

# Programming TKTP/TKRM Model

Please Follow Hand To Program

*TKP/TKM Series Only*



# Programming NPN Pulse Output (TKRP / TKRM Series)

Please Follow Hand To Program

Steps Only Necessary If NPN Pulse Output is Required

*TKRP/TKRM Series Only*

24V DC POWER ONLY	DISPLAY	DESCRIPTION
<p><b>Step-1</b> Programming Flow Meter</p> <p>Press  Then Press  SET</p>		<p><b>TKRP/TKRM Series Only CV</b> Display Reads 0 SV Display Reads 0.0 Totalizer Default 0.0 Flow Rate Default</p> <p><b>CV = Current Value</b> <b>SV = Programmed Value</b></p>
<p>Press  then Press Set &amp; Adjust</p> <p><b>Step-2</b> Programming Flow Rate Pulse Output</p> <p>Press  To Change Value</p> <p>Op1</p>		<p><b>TKRP/TKRM Series Only (Pulse ON-OFF)</b> <b>CV</b> Program Value of (Flow Rate) Pulse (NPN) Output Preset Value of Flow Rate Change to a Value that meets your Flow Rate Pulse Output <b>SV</b> <math>CV \geq SV \rightarrow</math> Flow Rate Pulse Output ON <math>CV &lt; SV \rightarrow</math> Flow Rate Pulse Output OFF <b>1000 Default</b> (One Pulse Per Gallon Default) (Flow Rate) Pulse</p>
<p>Press SET to Move to Save and Move to Next Screen</p> <p><b>Step-3</b> Programming Flow total Pulse Output</p> <p>Press  Then Press  SET</p>		<p><b>TKRP/TKRM Series Only</b> <b>CV</b> Program Value of Flow Totalizer Pulse (NPN) Output <b>SV</b> :Preset value of Flow Total <b>SV</b> <math>CV \geq SV \rightarrow</math> Flow Rate output ON <b>2000 Default</b> this can be Changed to Desired Value Refer to Next Page Programming OP2 Output for Options for Totalizer Flow Totalizer Pulse (Step #2-Next Page)</p>
<p>Press SET Button to Move to Save Add Move to Next Screen</p> <p><b>Step-4</b> Programming Flow total Pulse Output</p> <p>Press </p>		<p><b>TKP/TKM Series Only</b> <b>Return to Home Screen</b> 0 Totalizer Default 0.0 Flow Rate Default</p>

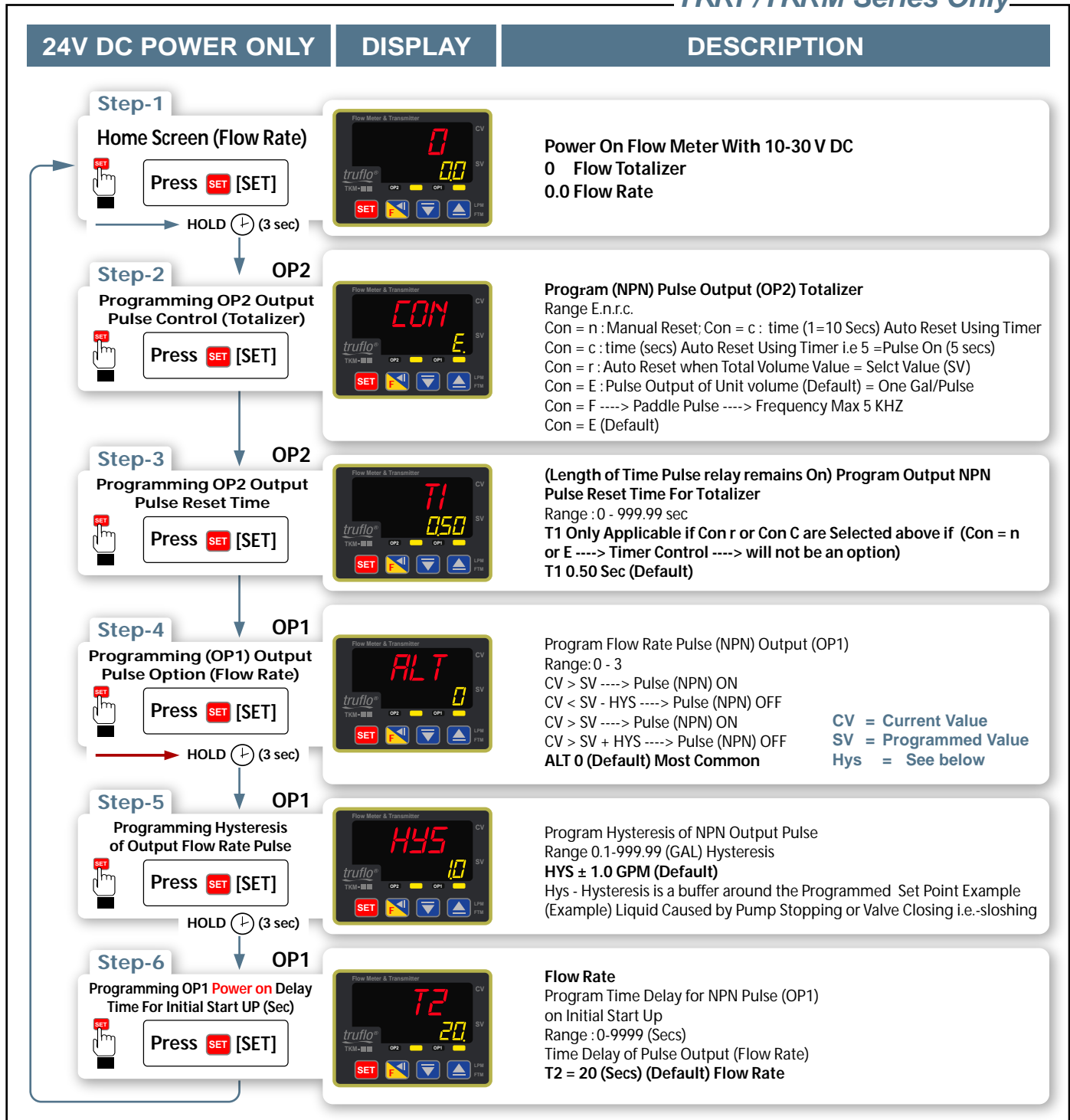
- Op1 & Op2 = 150mA Max Switching Current + Consumption is 60mA Max.
- CV = Current Value = Current Flow Rate on Display
- SV = Selected Value (Programmed Value Customer Entered)
- NPN Pulse is a Transistor

### Programming NPN Pulse Control Function (TKRP / TKRM Model Only)

OP1 = NPN Pulse Output (Flow Rate)  
OP2 = NPN Pulse Output (Flow Totalizer)

Please Follow Hand To Program

*TKRP/TKRM Series Only*



CV = Current Value  
SV = Programmed Value  
Hys = See below

OP1 = NPN Pulse Output (Flow Rate)  
OP2 = NPN Pulse Output (Flow Totalizer)

CV = Current Value SV = Programmed Value

## Mode of NPN Pulse Output TKRP/TKRM Models

ALT NO.	DESCRIPTION
Alt = 0	$CV > SV \longrightarrow ON$ : $CV < SV - HyS \longrightarrow OFF$
Alt = 1	$CV < SV \longrightarrow ON$ : $CV > SV + HyS \longrightarrow OFF$
Alt = 2	$SV + HyS > CV > SV - HyS \longrightarrow ON$ : $CV > SV + HyS$ or $CV < SV - HyS \longrightarrow OFF$
Alt = 3	$SV + HyS > CV > SV - HyS \longrightarrow OFF$ : $CV > SV + HyS$ or $CV < SV - HyS \longrightarrow ON$
Current Value = Flow Rate	SV = Selected Value = Programmed Value (Customer)
Hys = Hysteresis ACTS Like Buffer $\pm$ Around Pulse Output (Measured in GPM)	

## K-Factors for TKR Series Flow Meters (All Models)

Size	LPM	GPM
1/2"	124	471
3/4"	72	274
1"	45	171
1 1/2"	19	72
2"	10.3	39
3"	4.7	18
4"	2.1	8



**Required when programming remote display or controller.**

**K-Factor Pre Programmed by Factory - No Flow Meter Programming of a K-Factor is required.**

# Programming TKRS Model Only

Please Follow Hand To Program

*TKRS Series Only*

24V DC POWER ONLY	DISPLAY	DESCRIPTION
<p><b>Step-1</b></p> <p><b>Home Screen</b></p> <p>Press <b>SET</b> +  [SET] + F</p> <p>HOLD (3 sec)</p>		<p><b>TKS Series Only</b> Power Up Flow Meter with DC Power <b>000.0</b></p>
<p><b>Step-2</b></p> <p><b>Programing Lock Output</b></p> <p>Press <b>SET</b> [SET]</p>		<p>Programming Lock - Out Secure Feature Lk = 10 (Unlocked Status) - <b>(Default)</b> Changing Number will Lock Flow Meter <b>LK.10 (Default)</b> <b>10 = Unlocked</b> If any other Number is entered the Programming will be restricted</p>
<p><b>Step-3</b></p> <p><b>No Programming Required K Value</b></p> <p>Press <b>SET</b> [SET]</p>		<p>K-Factor Range : 0.1-999.9 (Depends on Meter Size - Factory Pre- Programmed) Ut = 0 : (LPM) Ut = 1 : (GPM) Ut = 2 : {Kiloliter (KL)} <b>UT 1 (Default)</b> K Value Preset (Do Not Change) </p>
<p><b>Step-4</b></p> <p><b>Programming Communication Output Type</b></p> <p>Press <b>SET</b> [SET]</p>		<p>Programming NPN Pulse Output con.E - Output = 1 Pulse / Gal con.F - Paddle Pulse Output 5KHZ MAX-Remote Display <b>con.E (Default)</b></p>
<p><b>Step-5</b></p> <p><b>Programming of Relay Set Point</b></p> <p>Press <b>SET</b> [SET]</p>		<p>Programming Relay Setpoint ON - OFF Options Select ALT.0 ALT.1 ALT.2 ALT.3 <b>ALT.0 (Default)</b> See Next Page for Relay Alarm Options</p>
<p><b>Step-6</b></p> <p><b>Programming Relay Time Delay</b></p> <p>Press <b>SET</b> [SET]</p>		<p>Programming Initial Start-Up Relay Time Delay Range : 0-99 sec Delay Time to Power on Alarm Output Relay <b>T.20 (Default)</b> (20 Seconds) Initial Start up of Flow Meter or Process (Allows for System Steady State before Relay Switch becomes Active).</p>



### Programming TKRS Model Only

#### Program Relay Set Point And Relay Delay (Prevents Relay Chatter)

Please Follow Hand To Program

*TKRS Series Only*

24V DC POWER ONLY	DISPLAY	DESCRIPTION
<p><b>Step-1</b></p> <p><b>Home Screen</b></p> <p>Press  [SET]</p> <p>HOLD (3 sec)</p>		<p>Power On Flow Meter - 24VDC <b>000.0 (Default) Home Screen</b></p>
<p><b>Step-2</b></p> <p><b>Programming Relay Set Point</b></p> <p>Press  [SET]</p>		<p>Programming Relay Set Point. (When Relay Switches) Range : 0.1 - 999.9 GPM <b>100.0 GPM (Default)</b> Relay will Activate when this Set Point or (Flow Rate) is Reached</p>
<p><b>Step-3</b></p> <p><b>Programming Relay Hysteresis</b></p> <p>Press  [SET]</p>		<p>Program Relay Hysteresis - Prevents Relay Chatter -Due to Constant Flow Rate Change around Setpoint in Dynamic Flow Process (Cushion ±) (Prevents Relay <b>d = Delay 0.10 (Default) GPM</b></p>

■ In the Programming Stage, the Display will Flash

### Relay ON - OFF Options For TKS Series Only (Not for TKP/TKM Series)

ALT NO.	DESCRIPTION
Alt = 0	$CV > SV \longrightarrow \text{Relay ON} : CV < SV - d \longrightarrow \text{Relay OFF}$
Alt = 1	$CV < SV \longrightarrow \text{Relay ON} : CV > SV + d \longrightarrow \text{Relay OFF}$
Alt = 2	$SV + d > CV > SV - d \longrightarrow \text{Relay ON} : CV > SV + d \text{ or } CV < SV - d \longrightarrow \text{Relay OFF}$
Alt = 3	$SV + d > CV > SV - d \longrightarrow \text{Relay OFF} : CV > SV + d \text{ or } CV < SV - d \longrightarrow \text{Relay ON}$
CV = Current Display Value = Flow Rate	
SV = Selected Value = Programmed Value	
d = (GPM) Hysteresis Measured around Relay Set Point (± Measured in Gallons)	

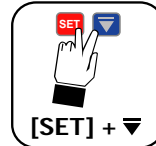
### General Terms

- 1) **K** : Coefficient of Flow Volume, **Note : Factory Set Do Not Change**
- 2) **tr** : TKM Range of Transmitter - Flow Rate 4-20 mA → 4mA = 0    20mA = Max Range  
TKP - RS 485 Option
- 3) **NPN** : Transistor Relay - No Moving Parts
- 5) **Con** : Output Control of Flow Total OP2, Con = n → Manual Reset  
Con = C - Time Reset (1=10 Secs) → Auto Reset, Con = r → Auto Reset,  
Based on Volume (GPM) Con = E → Pulse Output of Unit Volume,  
Con = F → Pulse Output of Paddle = 5 KHZ Max

### Important



**Totalizer Reset TKRP/TKRM**  
To Reset the Flow Totalizer to Zero Press



for (3 sec)  
**Important**

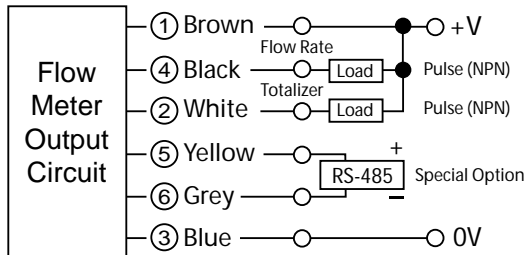
### Standard Pipe Size

Pipe Size (O.D.)	ANSI (ID) (Inches)		DIN (ID) (mm)	Flow Rate (LPM) / USGPM	
	Sch (40)	Sch (80)		0.3m/s min.	10m/s max.
DN15 (1/2")	0.62	0.55	Ø20	3.5 / 1.0	120 / 32
DN20 (3/4")	0.82	0.74	Ø25	5.0 / 1.5	170 / 45
DN25 (1")	1.00	0.96	Ø32	9.0 / 2.5	300 / 79
DN40 (1 1/2")	1.40	1.50	Ø50	25.0 / 6.5	850 / 225
DN50 (2")	2.00	1.90	Ø63	40.0 / 10.5	1350 / 357
2 1/2	2.50	2.30	Ø75	60.0 / 16	1850 / 357
DN80 (3")	3.10	2.90	Ø78	90.0 / 24	2800 / 739
DN100 (4")	4.00	3.80	Ø96.50	125.0 / 33	4350 / 1149

### Pressure vs. Temperature (psi | Water | Non-Shock)

NOMINAL SIZE		PVC				PP				PVDF				
		30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	- 5° F 85° F	86° F 120° F	121° F 140° F	141° F 175° F	- 5° F 70° F	71° F 105° F	106° F 140° F	141° F 175° F	176° F 210° F
INCHES	mm													
1/2-2	15-50	150	120	100	30	150	110	90	55	150	125	100	85	55
2-1/2	65	150	120	100	NA	150	95	70	40	150	125	100	85	55
3	80	150	120	100	NA	150	95	70	40	150	125	100	85	60
4	100	150	120	100	NA	150	95	70	40	150	125	100	85	60

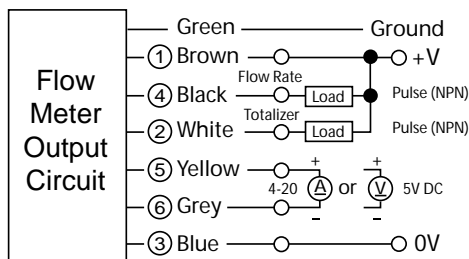
**MODEL TKRP FLOW RATE + FLOW TOTALIZER + NPN PULSE**



Brown	10 - 30 VDC (+)	Yellow	(+) RS-485 (OPT)
Blue	0V (-)	Grey	(-) RS-485 1 OPT RS485 is a Special Order Item
White	Totalizer Pulse Output NPN	Black	Flow Rate Pulse Output (NPN)

- Yellow & Grey with RS485 (Only) Black Wire can be Changed for Flow Total Limit Output or Unit Volume Pulse Output

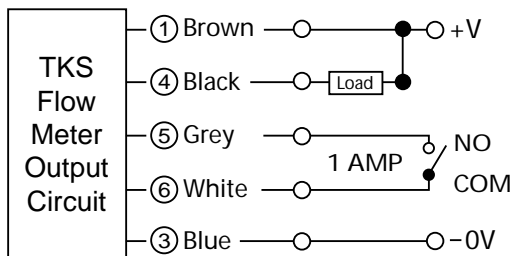
**MODEL TKRM (4-20mA Or 0-5V DC + NPN Pulse) FLOW RATE + FLOW TOTALIZER + PULSE**



Brown	10 - 30 VDC (+)	Yellow	+ (4-20mA) or (0-5V)
Blue	0V (-)	Grey	Totalizer Output NPN (4-20mA or 0 - 5V DC) (4-20mA Default -0-5VDC Option-Special Order)
White	Totalizer Pulse Output NPN	Black	Flow Rate Pulse Output NPN

- Black Wire can be Changed for Flow Total Limit Output or Unit Volume Pulse Output

**MODEL TKRS NPN (FLOW RATE - RELAY + PULSE)**



Brown	10 - 30 VDC (+)	White	COM
Blue	0V (-)	Grey	NO
Black	Flow Rate Pulse Output (NPN)		1 Amp

- Black Wire is a Unit Volume NPN Pulse Output-1 pulse for every gallon



**TKRP - Yellow & Grey wires with RS - 485 Option**

**Only Current output (4 - 20mA)  $\Omega$ 120 max.**

**Voltage output (0 - 5V) : 10K  $\Omega$  min.**

**DC Power Only**

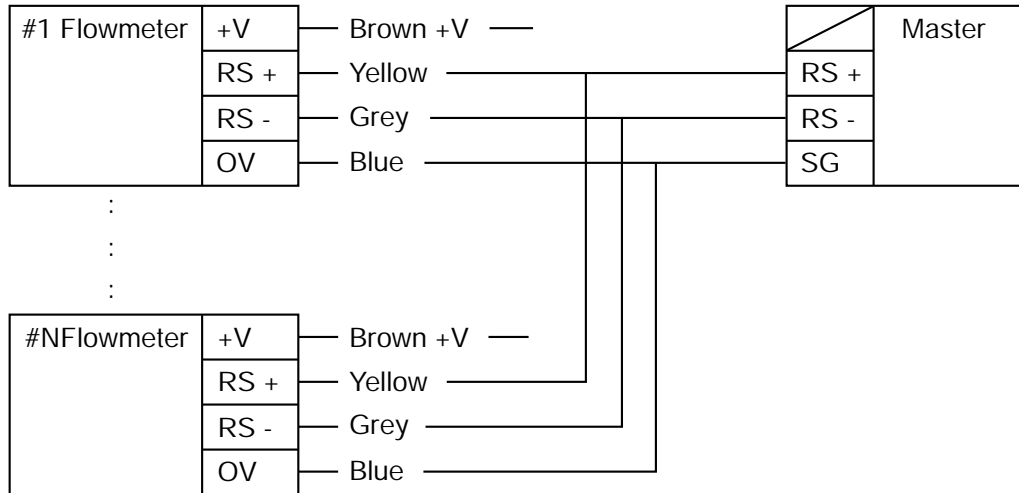
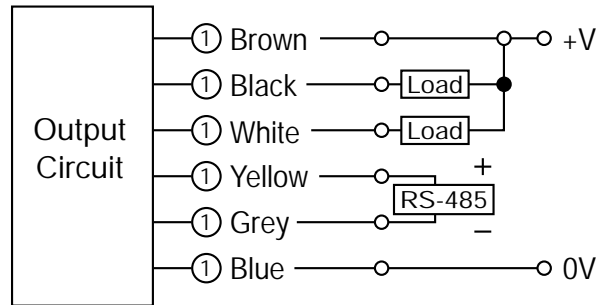
**TKRM Series (0-5VDC) Optional 4-20mA is Standard**

# Instruction Manual / RS-485

## RS-485 Modbus Protocol -IV

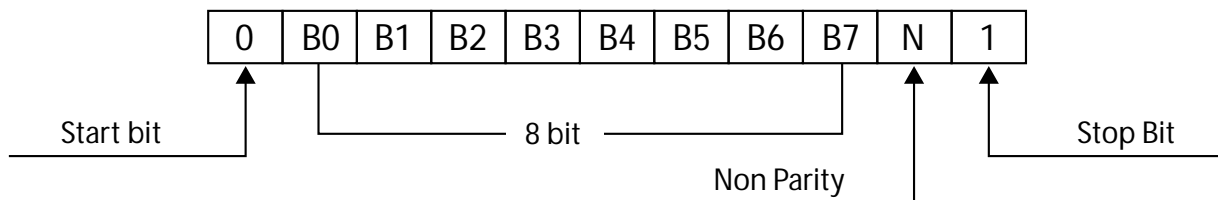
Thank you very much for using Truflo TK series flow meter Please read this instruction manual before operating it to avoid from the malfunction.

### Connection Diagram



Communication Standard	EIA-RS 485	Communication Speed	9600 or 19200 or 38400 bps
Communication Mode	RS=0 : 「MODBUS- RTU mode」 RS=1 : 「MODBUS-ASCII mode」	Communication Station No.	ID No. = 01 ~ 99 (01H ~ 63H)

### Configuration of Communication (8N1)



## RS-485 communication Address of parameter register

Address No.	Parameter	Description	Read Write	Decimal point	Range of Data
00H 01H	Lck	Lock setting	R / W	0	0 ~ 9999
00H 01H	Ut	Unit selecting	R / W	0	0 ~ 3
00H 01H	k	K value setting	R / W	1	0.1 ~ 999.9
00H 01H	t r (iLo word)	Transmitter range	R / W	1	0.1 ~ 9999.9
00H 01H	t r (iHi word)				
00H 01H	SPn	Transmitter span	R / W	3	0.000 ~ 9.999
00H 01H	OSt (iLo word)	Transmitter offset	R / W	3	0.000 ~ 999.999
00H 01H	OSt (iHi word)				
00H 01H	Con*	Control mode	R / W	0	0 ~ 3
00H 01H	t 1	Reset time	R / W	2	0.1 ~ 999.9
00H 01H	ALt	Output status (LPM Op 1)	R / W	0	0 ~ 3
00H 01H	HYS	Hysteresis (LPM)	R / W	1	0.1 ~ 999.9
00H 01H	t 2	Delay time (OP1)	R / W	0	0 ~ 99
00H 01H	r S*	RS-485 mode	R / W	0	0 ~ 1
00H 01H	bPS*	Baud rate	R / W	0	0 ~ 2
00H 01H	l d	Station No.	R	0	0 ~ 99
00H 01H	SV1 (Lo word)	Flow rate setting	R / W	1	0.0 ~ 99999.9
00H 01H	SV1 (Hi word)				
00H 01H	SV2 (Lo word)	Flow volume setting	R / W	0	0 ~ 999999
00H 01H	SV2 (Hi word)				
00H 01H	PV (Lo word)	Flow rate value	R	1	0.0 ~ 99999.9
00H 01H	PV (Hi word)				
00H 01H	CV (Lo word)	Flow volume value	R / W	0	0 ~ 999999
00H 01H	CV (Hi word)				
00H 01H	Output status*	Out1 & Out2 output status	R	0	0 ~ 3

Decimal point FALL value of the parameter is processed to integer, Ex. 「123.4」 「1234」

「Con\*」: 「0」= 「n」, 「1」= 「r」, 「2」= 「c」, 「3」= 「E」

「r S\*」: 「0」= 「Modbus - RTU mode」, 「1」= 「Modbus - ASCII mode」

「bPS\*」: 「0」= 「9600」, 「1」= 「19200」, 「2」= 「38400」

### Output Status\*\*\*\*

Data	Out1	Out2	Data	Out1	Out2	Data	Out1	Out2	Data	Out1	Out2
00H 00H	Off	Off	00H 01H	On	Off	00H 02H	Off	On	00H 03H	On	On

### Remarks

Symbol	ASCII code	Description	Symbol	ASCII Code	Description	Symbol	ASCII Code	Description
@	40	Start code	C	43	Hex	4	34	Hex / BCD
R	52	Read	D	44	Hex	5	35	Hex / BCD
W	57	Write	E	45	Hex	6	36	Hex / BCD
CR	0D	Stop code	F	46	Hex	7	37	Hex / BCD
-	2D	Minus	1	31	Hex / BCD	8	38	Hex / BCD
A	41	Hex	2	32	Hex / BCD	9	39	Hex / BCD
B	42	Hex	3	33	Hex / BCD	:	3A	Hex

## Message format

MODBUS RTU	Read command :	Station No.	Function code	Address	Batches of Data	CRC		
	Read response :	Station No.	Function code	Data byte counts	Data	CRC		
MODBUS ASCII	Read command :	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	Read response :	Start code	Station No.	Function code	Address	Data	LRC	Stop code

## Function code

Function code	Function	Description
03H	Read	To read the data on register
06H	Write (Single word)	To write the preset value on register
10H	Write (Double word)	To write the preset value on register
08H	Diagnose	To diagnose the error of message format

Ex : 「 Read the CV value (flow volume) of No.01 flow meter ; CV=123456 (01E240H) (Liters ) 」 and  
「 Write the K value (K factor) of No.01 flow meter ; K=123.4 (04D2H) 」  
「 Write the SV1 value (Flow rate setting) of No.01 flow meter ; SV1=12345.6 (01E240H) 」  
(Station No= 01H,CV address = 22H/23H,CV = 123456 (01E240H) , K address = 03H,K=123.4 (04D2H)  
(SV1 address = 14H/15H,SV1 = 123456 (01E240H))

### Communication mode : 「RS = 0 : MODBUS . RTU code」

Read command	Station No. 01H	Function code 03H	Address 00H 22H	Batches of data 00H 02H	CRC 64H 01H
Read response	Station No. 01H	Function code 03H	Data byte counts 04H	Data E2H 40H 00H 01H	CRC E2H A3H
Write command	Station No. 01H	Function code 06H	Address 00H 03H	Data 04H D2H	CRC FBH 57H
Write response	Station No. 01H	Function code 06H	Address 00H 03H	Data 04H D2H	CRC FBH 57H
Write command	Station No. 01H	Function code 10H	Address 00H 14H	Data E2H 40H 00H 01H	CRC 56H 69H
Write response	Station No. 01H	Function code 10H	Address 00H 14H	Data E2H 40H 00H 01H	CRC 56H 69H

### Communication mode : 「RS = 1 FMODBUS . ASCII code」

Read command	Start code 3AH	Station No. 30H 31H	Function code 30H 33H	Address 30H 30H 32H 32H	Batches of data* 30H30H 30H32H	LRC 42H 36H	Stop code 0DH 0AH
Read response	Start code 3AH	Station No. 30H 31H	Function code 30H 33H	Data byte counts** 30H 34H	Data *1	LRC 33H 43H	Stop code 0DH 0AH
Write command	Start code 3AH	Station No. 30H 31H	Function code 30H 33H	Address 30H 30H 30H 33H	Data *2	LRC 39H 43H	Stop code 0DH 0AH
Write response	Start code 3AH	Station No. 30H 31H	Function code 30H 33H	Address 30H 30H 30H 33H	Data *2	LRC 39H 43H	Stop code 0DH 0AH

Data byte counts\*\* : 2 ASCII code byte = 1 data byte

\*1 : 45H 32H 34H 30H 30H 30H 30H 31H (4 data bytes)      \*2 : 30H 34H 44H 32H (2 data bytes)

## Calculation of 「FCS」

(RS = 0 FMODBUS . RTU code) : FCS = CRC .16 (Cyclic redundancy check)

### Procedure of CRC-16 calculation

1. To load FFH FFH to the 16 bit CRC register
2. To exclusive OR (\*) the first byte of the message format with the low order byte of the 16 bit CRC register, then put the result in the 16 bit CRC register.
3. To shift the CRC register one bit to right (toward the LSB) and fill the MSB with zero.
4. To repeat the step 3 If the carry flag is 0 (LSB is 0), Exclusive OR the CRC register with A001H which is the value of polynomial if the carry flag is 1 (LSB is 1), then put the result in the 16 bit CRC register.
5. To repeat the step3 and 4 until the 16 bit CRC register is shifted 8 times
6. To repeat from step 2 to step 5 for the next byte of the message format until final byte of message is completed. (Except the CRC bytes)
7. To get the CRC value by changing the high order and low order byte of the final CRC register.

(RS = 1 FMODBUS . ASCII code) FFCS = LRC

### Procedure of LRC calculation

1. To add all bytes in the message format, excluding the start code 「F」, and ending code (0DH 0AH), then put this value in an 8-bit field.
2. To get a Two's complement from this 8-bit field. it is named 「Y」 (8-bit field also)
3. To get the LRC value by changing the Hex code to ASCII code from the 「Y」.

## Error response code

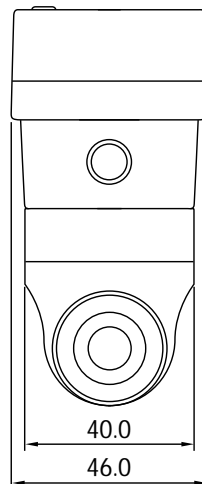
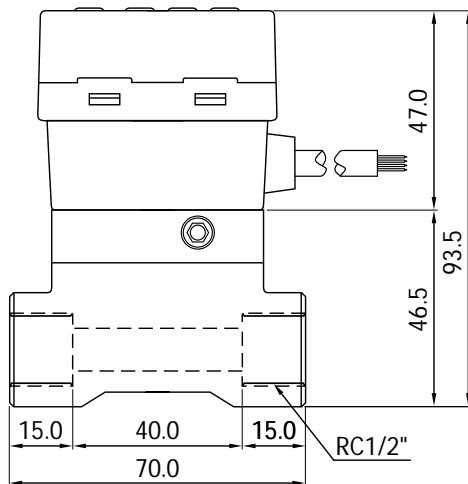
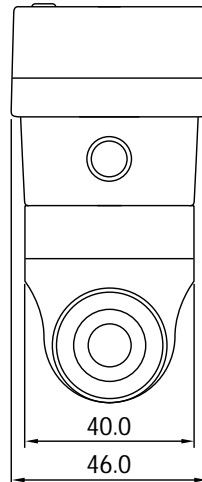
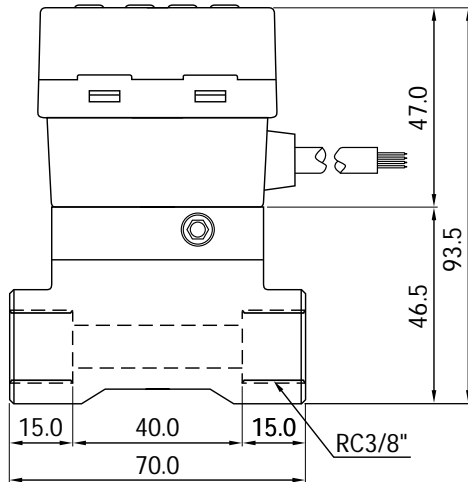
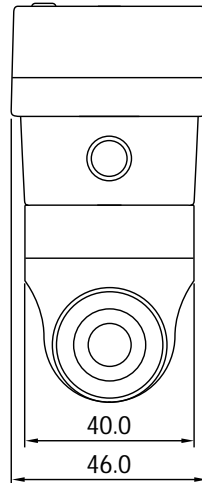
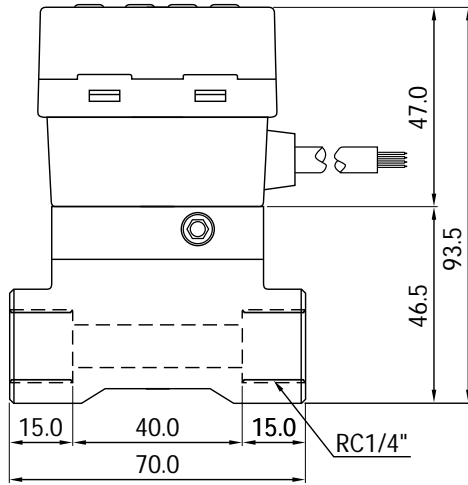
### Message format

RS = 0 FMODBUS . RTU code				
Function	Station No.	Function code	Error code	FCS
Read	<u>01H ~ 63H</u>	<u>83H</u>	<u>01H ~ 05H</u>	CRC-16
Write	<u>01H ~ 63H</u>	<u>86H</u>	<u>01H ~ 05H</u>	CRC-16

RS = 1 FMODBUS . ASCII code						
Function	Start code	Station No.	Function code	Error code	FCS	Stop code
Read	<u>3AH</u>	<u>30H 31H ~ 36H 33H</u>	<u>38H 33H</u>	<u>30H 31H ~ 30H 35H</u>	LRC	<u>0DH 0AH</u>
Write	<u>3AH</u>	<u>30H 31H ~ 36H 33H</u>	<u>38H 36H</u>	<u>30H 31H ~ 30H 35H</u>	LRC	<u>0DH 0AH</u>

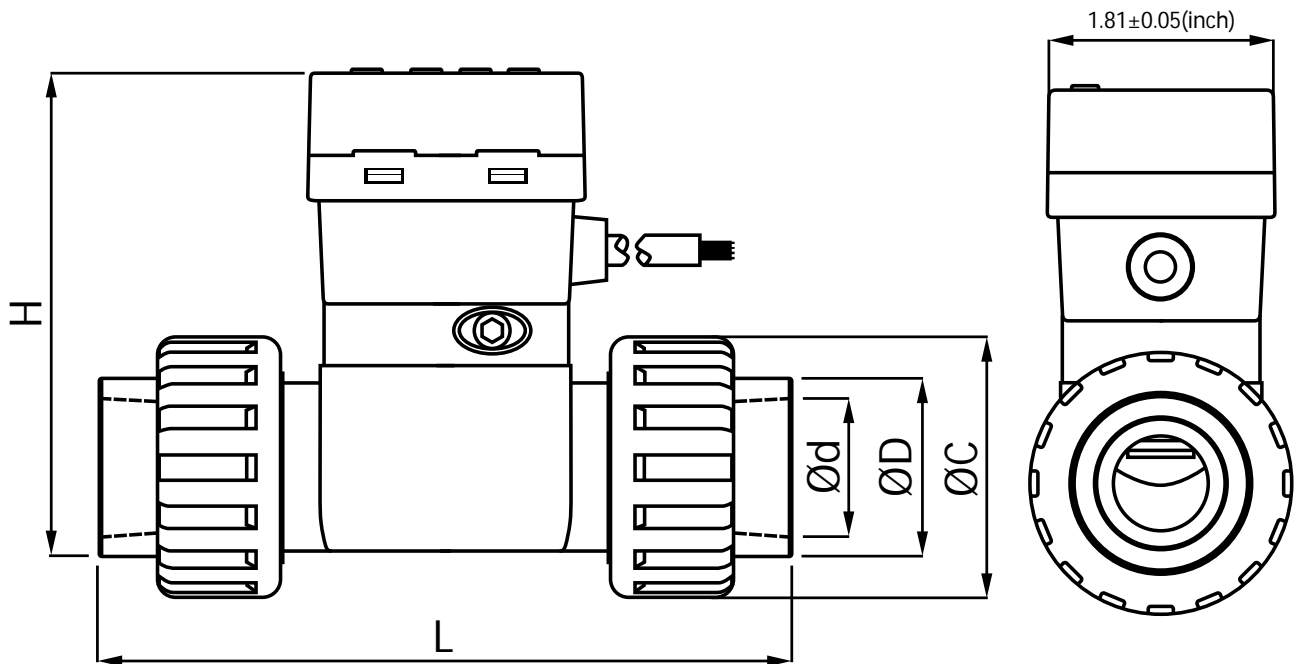
Error code					
Code		Description	Code		Description
MODBUS – RTU	<u>01H</u>	Command error	MODBUS – RTU	<u>03H</u>	Data overflow error
MODBUS – ASCII	<u>03H 31H</u>		MODBUS – ASCII	<u>30H 33H</u>	
MODBUS – RTU	<u>02H</u>	Address overflow error	MODBUS – RTU	<u>04H</u>	Data error
MODBUS – ASCII	<u>30H 32H</u>		MODBUS – ASCII	<u>30H 34H</u>	
MODBUS – RTU	<u>05H</u>	CRC or LRC error			
MODBUS – ASCII	<u>30H 35H</u>				

### Dimensions- TK3 Series



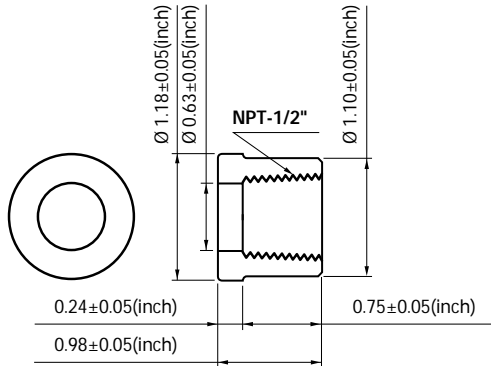


## Dimensions- TKRS/TKRP/TKRM Series

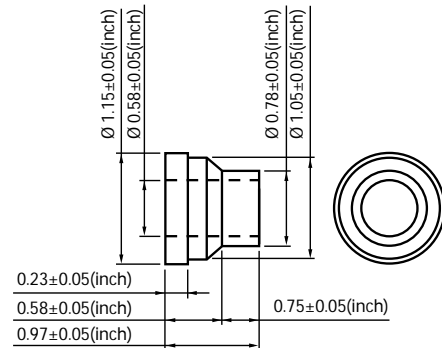


Pipe Size	H (inch)	L (inch)	Ød (inch)	ØD (inch)	ØC (inch)
(1/2") DN (15)	4.09±0.05	5.48±0.05	0.84±0.05	1.07±0.05	1.61±0.05
(3/4") DN (20)	4.17±0.05	6.12±0.05	1.05±0.05	1.36±0.05	2.08±0.05
(1") DN (25)	4.30±0.05	6.76±0.05	1.32±0.05	1.68±0.05	2.36±0.05
(1-1/2") DN (40)	5.02±0.05	7.66±0.05	1.91±0.05	2.33±0.05	3.26±0.05
(2") DN (50)	5.56±0.05	8.39±0.05	2.38±0.05	2.86±0.05	4.33±0.05

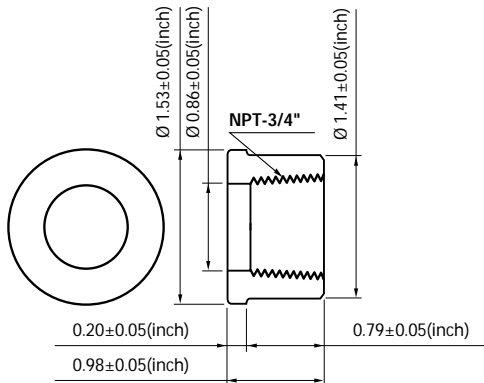
1/2" DN15-UNION-NPT-PP



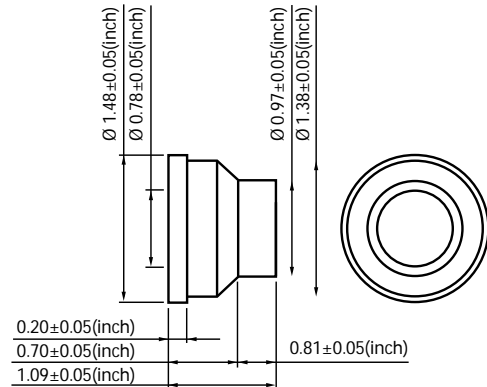
1/2" DN15-UNION-PP SDR 11 IR FUSION



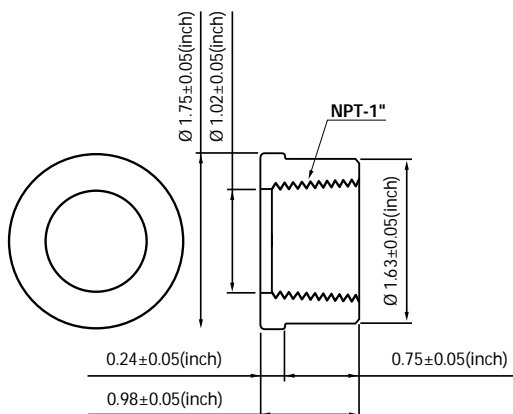
3/4" DN20-UNION-NPT



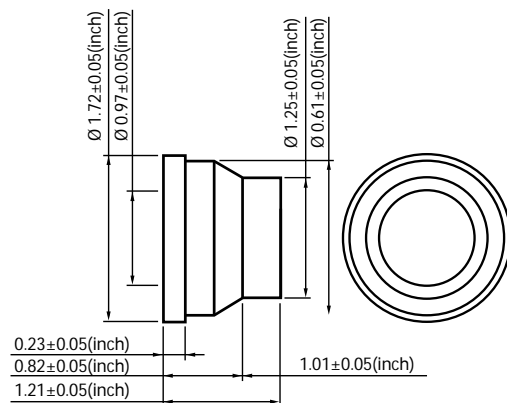
3/4" DN20-UNION-PP SDR 11 IR FUSION



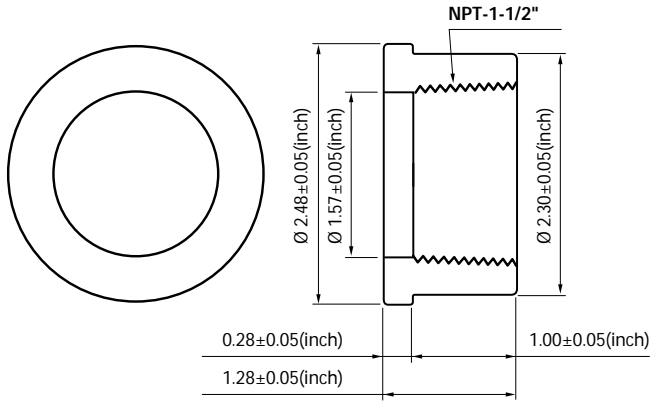
1" DN25-UNION-NPT



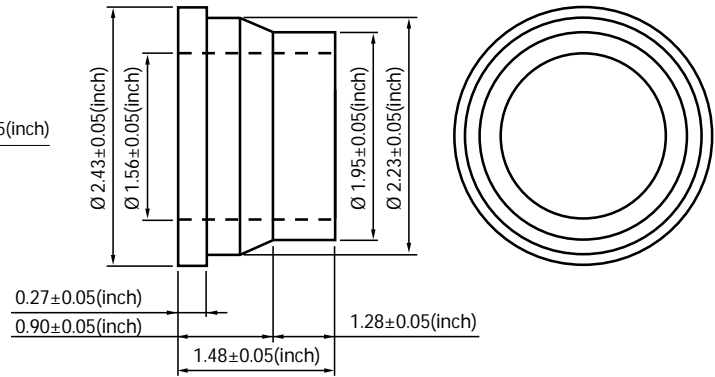
1" DN25-UNION-PP SDR 11 IR FUSION



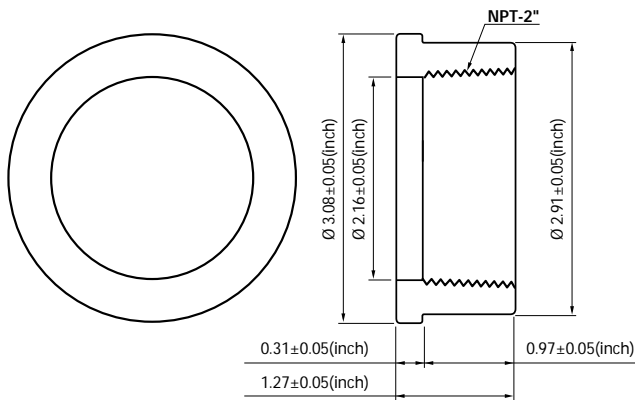
1½" DN40-UNION | NPT | PVC | PP|PVDF



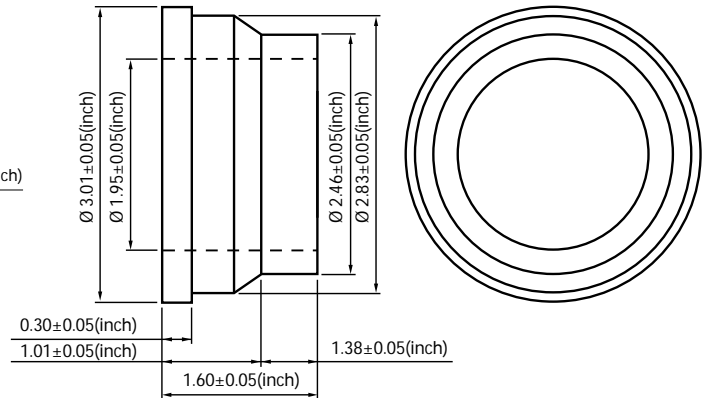
1½" DN40-UNION-PP PVDF  
SDR 11 IR FUSION



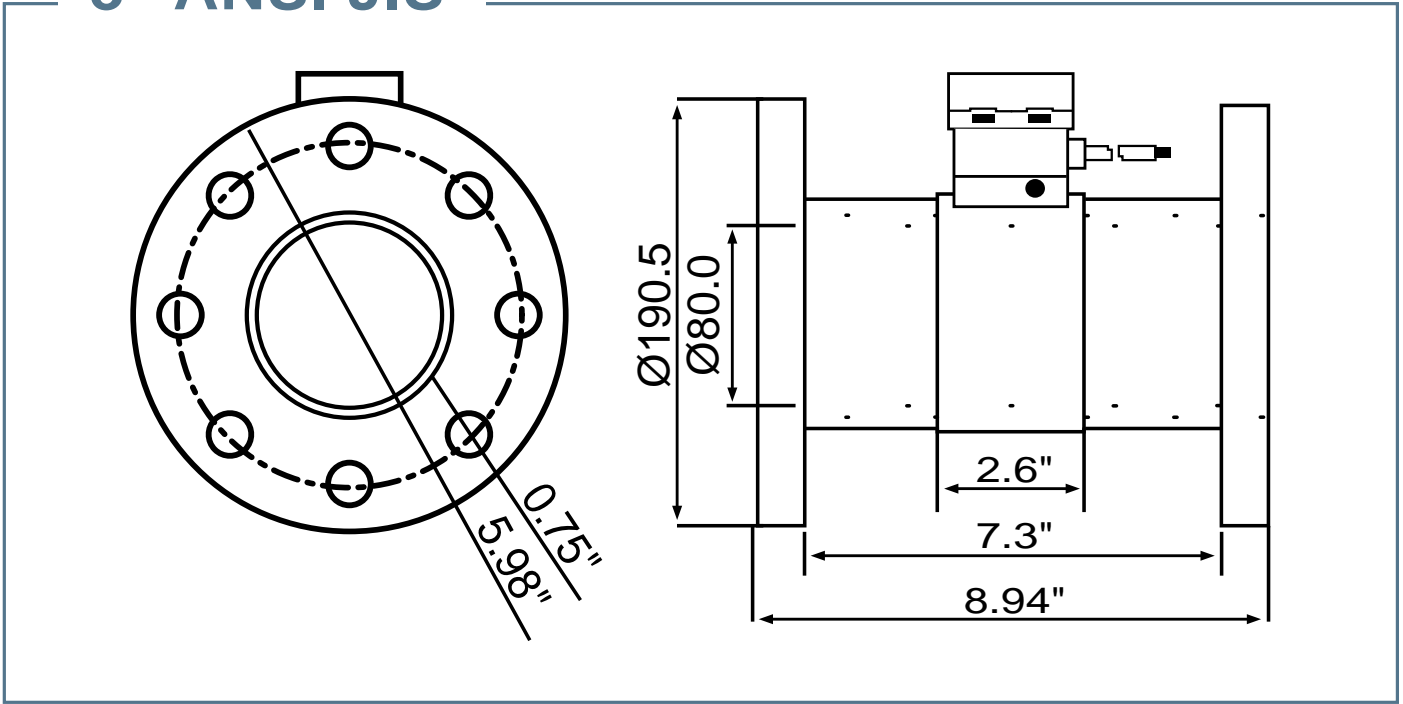
2" DN50-UNION | NPT | PVC | PP|PVDF



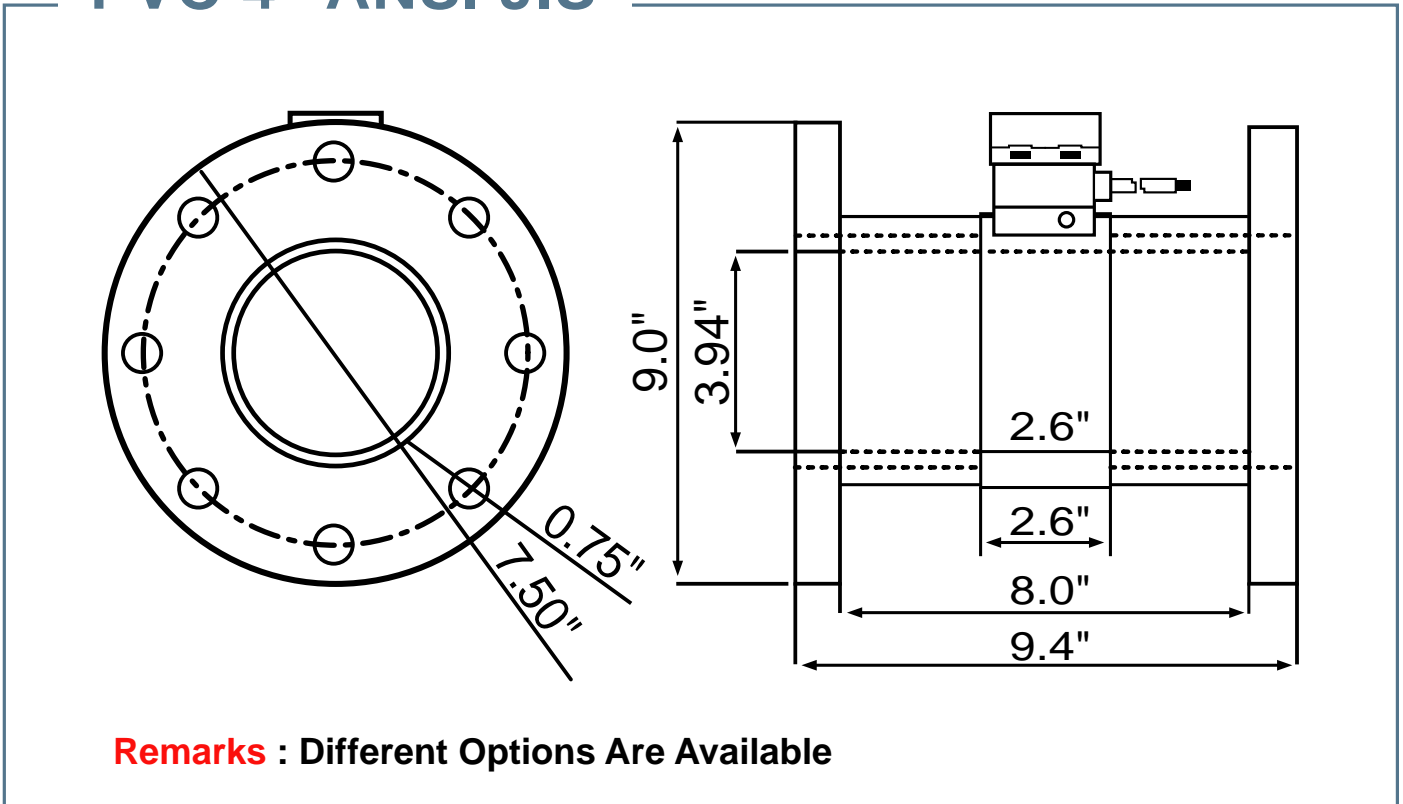
2" DN50-UNION| PP | PVDF  
SDR 11 IR FUSION



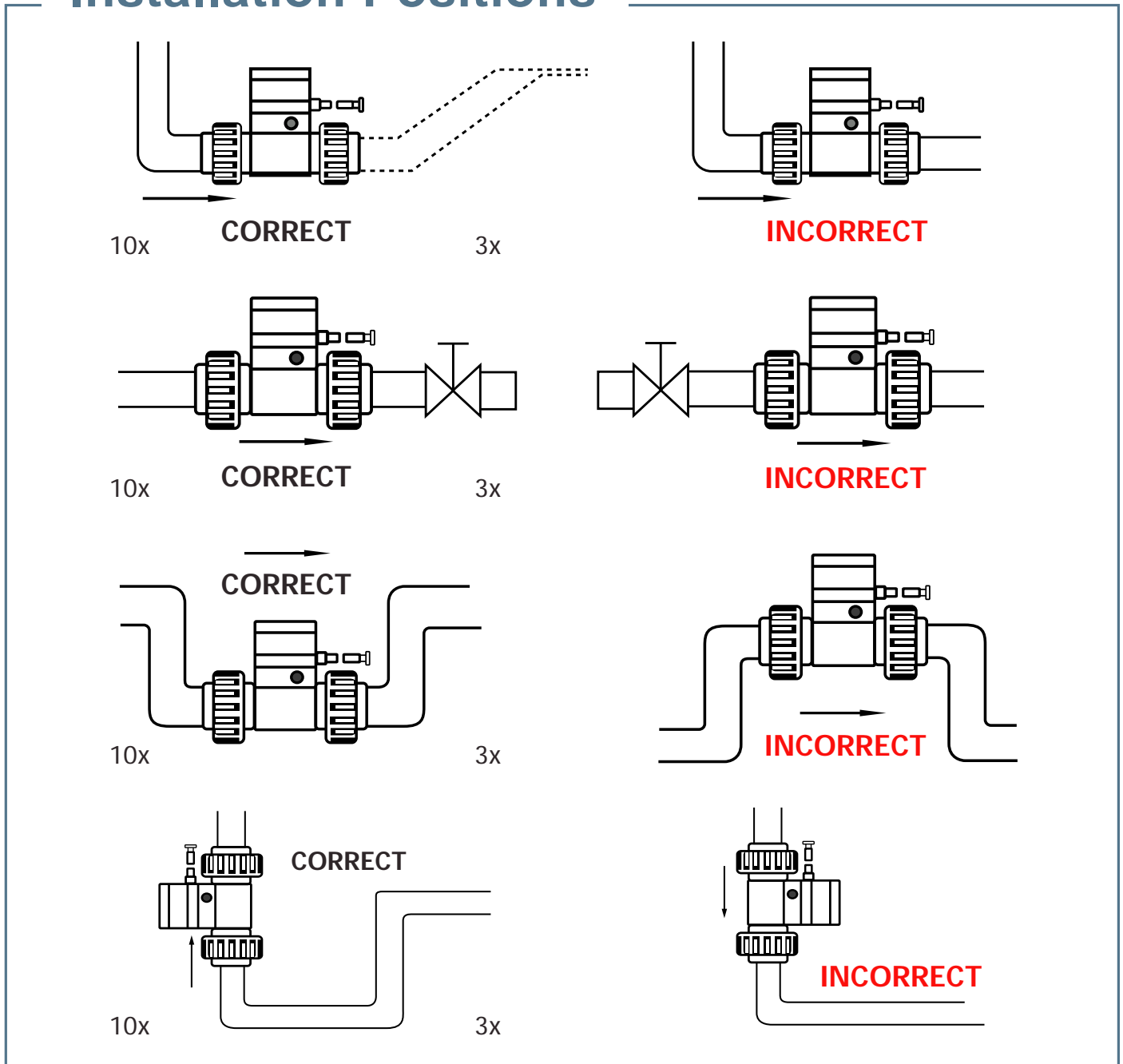
### 3" ANSI JIS



### PVC 4" ANSI JIS



## Installation Positions



Please make sure the pipe is filled with the fluid under normal operation.

TK Series can be installed in a horizontal or vertical direction.

Please ensure enough length of straight pipe to avoid turbulence that can effect readings.

**Note: Min 10x Pipe Diameters Upstream 3x Pipe Diameters Downstream.**

A Plastic Basket Strainer, Bag Filter or Y Strainer Filtering Device upstream to Avoid the Paddle Wheel from being damaged by the solids or fibers - max 10% Particle Size - Not to Exceed .5mm Cross Section or Length.

Please do not flush the pipe after the Flow Meter is installed with Compressed Air this may damage the ceramic shaft and will Void Warranty